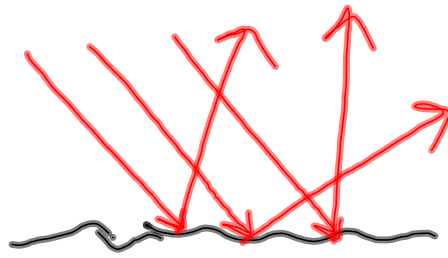


- Refraction:

- When light goes from lower n to higher n , light bends towards the normal.
- When light goes from higher n to lower n , light bends away from the normal.

- Reflection:

- Diffuse



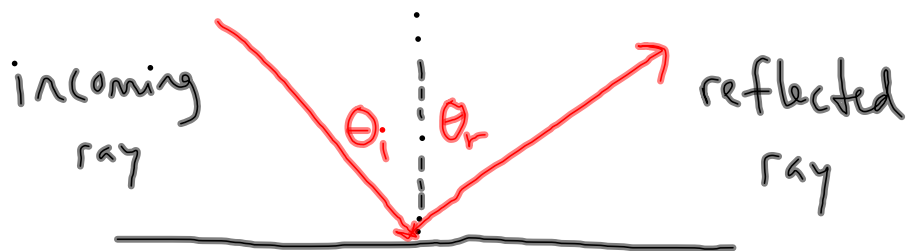
reflected light is not coherent,
so there is no image formed

- Spectral



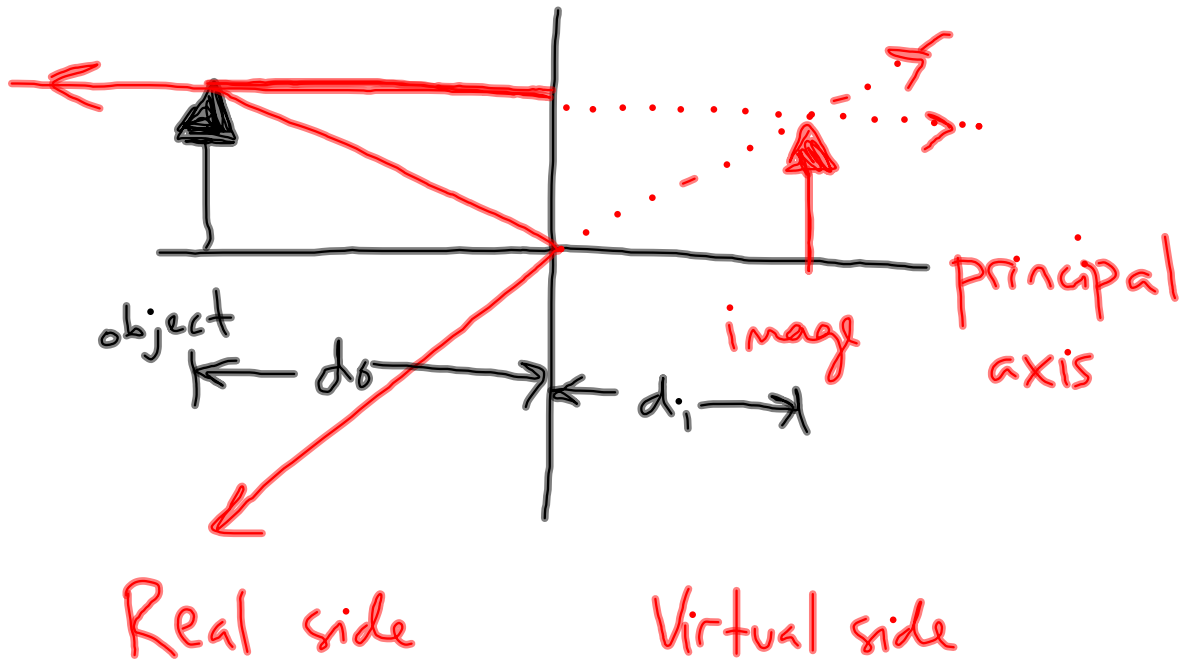
reflected light is coherent,
image will be formed

- angle of reflection:



$$\theta_i = \theta_r$$

• Flat mirrors:

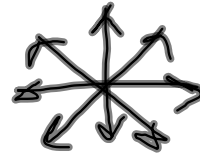


- Where rays intersect is called an image
- Image can be real or virtual
- For a flat mirror,

$$d_o = d_i$$

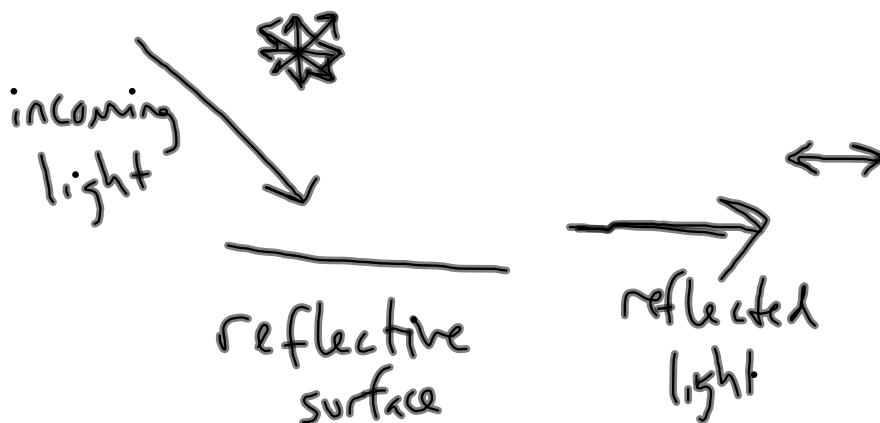
- Polarization:

- "Normal" light



- Polarization is the way the light is aligned.

- When light bounces off a reflective surface, the alignment becomes set.



What is the length of an open/open pipe in which the fifth harmonic has a frequency of 3840 Hz? The speed of sound is 346 m/s.

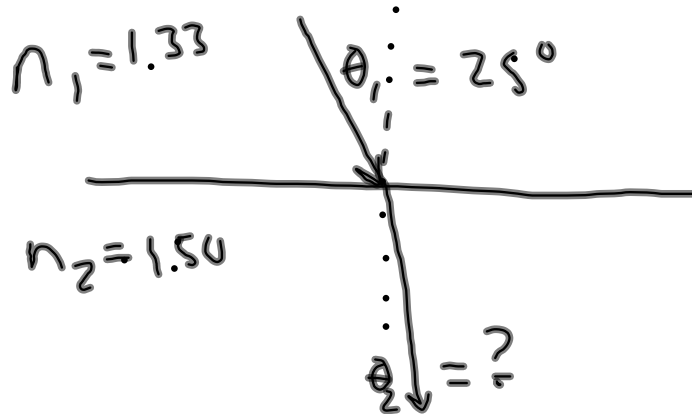
$$f_n = \frac{nv}{2L} \quad n=5$$

$$L = \frac{nv}{2f_n}$$

$$= \frac{(5)(346 \text{ m/s})}{2(3840 \text{ Hz})}$$

$$= .225 \text{ m}$$

A light ray travels through water ($n = 1.33$) and enters glass ($n = 1.50$). If the incoming angle is equal to 25 degrees, what is the angle that the light makes with the normal when it enters the glass?



$$n_1 \sin \theta_1 = n_2 \sin \theta_2$$

$$\sin \theta_2 = \frac{n_1}{n_2} \sin \theta_1$$

$$\theta_2 = \sin^{-1} \left(\frac{n_2}{n_1} \sin \theta_1 \right)$$

$$= \sin^{-1} \left[\left(\frac{1.50}{1.33} \right) \sin (25^\circ) \right]$$

$$= 22^\circ$$